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Food Aid Technology: The Experience of a Syrian Refugee Community in Coping with Food Insecurity (pre-print

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Over half of Syrian refugee households in Lebanon are food insecure with some reliant on an electronic voucher (e-voucher) system for food aid. The interplay between the digitisation of food aid, within the socio-technical context of refugees, and community collaborative practices is yet to be investigated. Through design engagements and interviews with refugees and shop owners we explore the experiences of a Syrian refugee community in Lebanon using the e-voucher system. We provide insights into the socio-technical environment in which the e-voucher system is dispensing aid, the information and power asymmetries experienced, refugee collaborative coping practices and how they interplay with the e-voucher system. We highlight the need for: (1) expanding refugee digital capabilities to encompass understandings of aid technologies and identifying trusted intermediaries and (2) for technologies to support in upholding humanitarian principles and mitigating power and information asymmetries. Lastly, we call for CSCW researchers and humanitarian innovators to consider how humanitarian technologies can enable refugee collaborative practices and adopt everyday security as a lens for designing aid technologies. The paper contributes to CSCW knowledge regarding the interplay between aid technologies and refugees' socio-technical contexts and practices that provides a basis for future technological designs for collaborative technologies for refugee food security.

CCS Concepts: • **Human-centered computing → Empirical studies in collaborative and social computing**.

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1 INTRODUCTION

With the growing refugee crisis facing the world, humanitarian organisations are turning towards digital innovation to transform aid; thus, making it more efficient and effective [38, 67]. Recently food aid is increasingly being dispensed through the provision of debit cards, called e-vouchers, to refugees, which can be used to purchase food from registered shops. The move to e-vouchers has been attributed to decreasing the logistical cost of distributing aid [75] and has been found to be effective in improving refugee food security [5]. Furthermore, it gives refugees more agency in selecting food products when compared to the previous system of dispensing food parcels [75]. However, humanitarian scholars [21, 34, 49, 53], have expressed skepticism regarding the turn to digital solutions, as they may not take into consideration the socio-political, economic and technical environments in which these technologies are used and may reproduce existing and/or create new power asymmetries. The fields of Computer-Supported Cooperative Work (CSCW) and Human-Computer Interaction (HCI) have yet to investigate how the digitisation of aid in refugee contexts, and more specifically food aid, is experienced on an individual level and a community level. In this paper we address this gap.

This paper provides an understanding of how the digitisation of food aid interplays with refugees' socio-technical environment. We present findings from engaging with a Syrian refugee community and other stakeholders within the digital food aid system in Lebanon over the span of 11 months. Engagements included the use of dialogues for co-constructing narratives of food insecurity, vignettes and semi-structured interviews. We highlight how the shifting of responsibilities, enacted through the digitisation of aid and the situatedness of the technology within the socio-technical context of Syrian refugees in Lebanon, create new power asymmetries. Such power asymmetries coupled with participants' low technological literacies had negative impacts on refugees' experiences of engaging with the food aid system. Furthermore, we identify existing collaborative practices within the refugee community and explore how the existing food aid technology hinders collaborative practices. We discuss our findings in relation to existing literature on collaboration to cope with the digitisation of services [28, 45] and poverty [59, 73] and sharing economies and Alternative Food Networks (AFNs) [15, 27, 47, 48]. In doing so we highlight key considerations for the future humanitarian innovation policy and practice, and CSCW research in refugee contexts. We highlight that within the socio-technical context in which refugees interact with humanitarian technologies, it is essential that refugee digital literacies are expanded to enable refugees to identify and report the misuse of the technologies by other stakeholders and intermediaries. Additionally, we highlight considerations for how technologies may not only embody humanitarian principles (e.g. humanity) but also be designed in a manner that ensures new stakeholders taking on humanitarian responsibilities abide by the principles. We contribute knowledge regarding how humanitarian technologies and aid can support collaborative practices within refugee communities and mitigate power asymmetries within collaborations between refugees and other stakeholders. Lastly, we also reflect on our findings through the lens of everyday security and identify how the adoption of such a lens can contribute to the design of humanitarian technologies.

2 RELATED WORK

To frame our findings, we provide a synthesis of literature that highlights key socio-technical aspects of refugee and asylum seeking contexts that warrant consideration when designing and deploying technologies. We also provide an overview of literature on everyday security, power asymmetries and the shifting of responsibilities that pertain to the introduction of digitised services. Finally, we engage with literature that hones in on collaborative practices around food and collaboration in low socio-economic communities.

2.1 Refugees & CSCW

CSCW and HCI researchers have explored technology as a means of supporting refugees and asylum seekers [7, 24, 43, 56, 63, 74, 76]. Other research in the field has unpacked the different contextual factors that need to be considered when designing technologies specifically for this population. Indeed, several studies indicate that their complex contexts often prevent refugees and asylum seekers from accessing much needed information and services [19, 33, 65, 74]. For example, financial and legal regulations in Germany and Austria have been identified as barriers for refugees and asylum seekers to access language classes and professional services [61, 74]. Within the context of Lebanon, studies [63, 65, 66] have discussed how social and political factors contribute to Syrian refugees experiencing loss of dignity and low levels of agency within their interactions with aid, health and food services. Furthermore, language [33, 56], integrating into new cultures [2, 43] and building social capital [3] have been identified as critical social challenges for refugees and asylum seekers. Additionally, factors related to refugees and asylum seekers' use and access to technologies have also been highlighted as challenges. Duarte et al. [19] highlight that while geo-spatial services provide information to refugees in Germany, refugees' lack of experience in using such digital services may make them ineffective. Research within refugee camps and settlements has also shown how limited internet connectivity [55] and access to technologies [24, 51] within these spaces pose a significant challenge for the use of technologies to support refugees. Such technological obstacles contribute to access divides within different refugee communities.

The economic, political, infrastructural and technology literacy factors that influence refugees and asylum seekers' everyday experiences and interactions with technologies call for a detailed understanding of the challenges they face [74]. Similarly, humanitarian research has highlighted that socio-political factors influence refugees' ability to access aid [46]. To our knowledge, a detailed understanding of the social contexts in which humanitarian technologies for distributing aid are experienced by refugees has yet to be explored. This level of understanding is needed when considering how humanitarian technologies reshape power relationships and the distribution of aid as well as alter refugees and stakeholders' practices on the ground [34, 53].

2.2 Everyday Security, Power Asymmetries & Shifting Responsibilities

Within HCI and CSCW literature, the power relationships that are enforced and created through the digitisation of aid and refugee services have been primarily focused on the sharing of personal information [12, 57] and connecting to bureaucratic processes [13]. The uniquely precarious position that refugees and asylum seekers find themselves in and their dependency on aid organisations is attributed to their lack of agency in controlling their personal information [12, 57]. Furthermore, the integration of technologies to facilitate resettlement services has been found to amplify the pressures on refugees to constantly remain digitally connected to engage with bureaucratic processes [13]. This work shows how the everyday is a meeting point for numerous securities including state security and organisational security. In this paper we extend this research by further highlighting

the new everyday security and human risks [71] that result from the digitisation of food aid for a refugee community.

ICT4D literature has focused more on the power and information asymmetries that result from the imposing of technologies in contexts of poverty. Here, parallels can be drawn with the refugee context given the low technological literacies and access in both contexts. Studies examining the Indian government's move to demonetiasation, highlight that there was a lack of information communicated to the poor in India on how to open bank accounts; thus, making the process difficult and frustrating for them [41]. Furthermore, the sudden move to digital transactions opened up spaces of insecurity, where those still left without bank accounts, had to rely on informal institutions, such as moneylenders, that capitalised on the need for cash with new exploitative terms [39]. Such examples highlight the new threats to everyday security introduced by technologies that shift the mode through which people conduct transactions and seek support. We can also draw parallels between the introduction of digital technologies in the refugee food aid system and the integration of technologies into existing food systems in developing contexts. In India, it was identified that although technologies have been introduced to decrease corruption within the food aid distribution system, ration dealers still manage to cheat the system [40, 42]. Through muting the system, that is designed to keep beneficiaries informed of the quantities of food allocated to them, and by adding weights to the machine to provide less food to beneficiaries ration dealers circumnavigate the system to siphon off supplies [42].

The aforementioned studies in India contrast with the context of our studies in that: Firstly, they are limited to the introduction of a technology into an already existing food supply chain where beneficiaries continued to interact with the same actors as they had prior to digitisation [40]; Secondly, in refugee contexts interactions are compounded with local actors in host communities viewing refugees to be a separate group, within their towns and cities, than Lebanese [29, 64, 66]. As such refugee experiences are characterised by navigating the micro-politics of accessing aid that has not been identified in ICT4D literature on food aid. In this study we examine how the shifting of responsibilities within the aid system (from NGO employees to shop owners), through the digitisation of aid, introduces new practices and power asymmetries that interplay with social, political and technological factors and result in new refugee experiences of everyday insecurity.

2.3 Collaborative Practices, Digitisation and Food

In developing contexts those with lower technological literacies, similar to that of refugees, collaborate with trusted intermediaries to engage in mobile transaction and mobile banking [28, 45]. Reliance on intermediaries to complete digital transactions can be attributed to those of low technological literacy fearing that they would make mistakes that would result in a loss of money [28, 72]. However, such a reliance on intermediaries leaves space for exploitation by those with higher technological literacy, thus reiterating the importance of trusted social networks within these contexts [28].

CSCW and HCI researchers have yet to explore collaboration in the face of food insecurity in humanitarian contexts, with the majority of studies focusing on collaborative practices that aim at improving food sustainability [23, 27]. Few studies have explored technologies within contexts of poverty and limited access to healthy food products [15, 60, 73] i.e. food deserts. Here, researchers have identified that new models of online grocery delivery services, made possible through sharing economies, may improve access to healthy affordable food as they enable users to access a larger and more competitive market [15]. Furthermore, in other contexts of austerity, it has been found that individuals employ their social networks to carpool to visit food markets and to share information on prices [60, 73]. Lastly, technologies have been identified as tools to support Alternative Food

Networks that support communities to come together to help promote social justice throughout the supply chain [47, 48].

The literature provided show the importance of collaborative practices in navigating the introduction of a new technological system or service as well as the potential for technologies to support collaborative food systems. In this paper, we build on this knowledge by showing not only how refugees collaborate with shop owners to navigate a digital food aid system but also how digitised aid may hinder community collaborative practices used to cope with food insecurity. The community collaborative practices are not necessarily triggered by the introduction of a technology but rather by the new context of poverty that refugees have found themselves in.

3 METHODS

We adopted a community-based action research approach in order to capture and design for the collaborative practices of refugee participants. We aimed to explore: *(1) the experiences of Syrian refugees in coping with food insecurity, (2) the collaborative action taken within a refugee community to cope with food insecurity, (3) how technologies are currently being used by a Syrian refugee community to improve their food security and (4) how future technologies may be designed and configured to support refugee collaboration to improve their food security.*

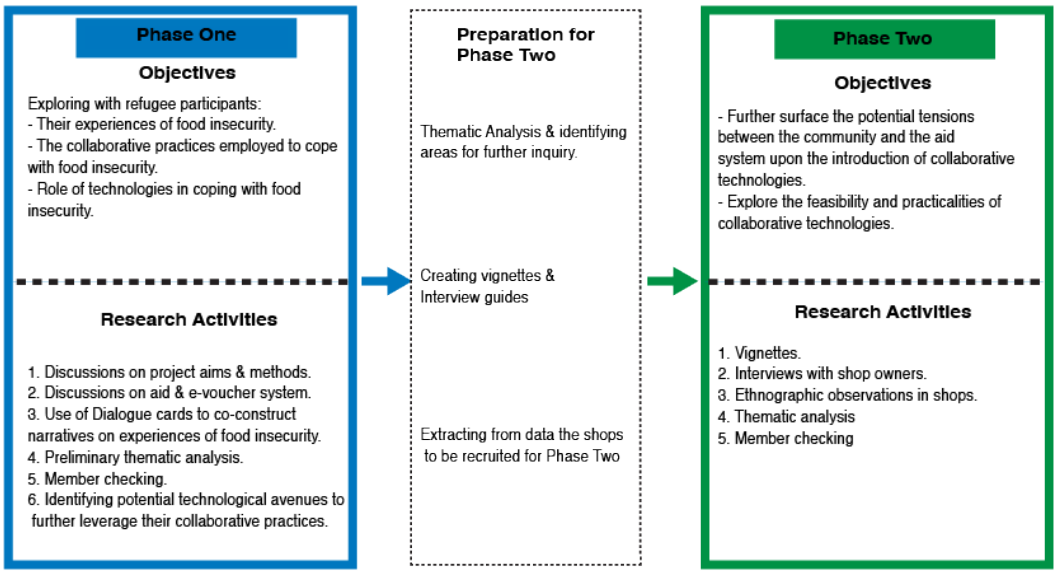

Fig. 1. detailing the research process including the research objectives for each phase and the corresponding research activities as well as how data from phase one guided the follow up research in phase two.

The research was conducted in two phases (Figure 1) spanning 11 months with refugee community members and grocery shop owners, as they are one of the primary stakeholders in the food aid system. Additionally, to gain an authentic understanding of the food aid system we conducted ethnographic observations in food shops local to the refugee community we were engaging with. The study obtained research ethics approval from Newcastle University (host institution at the time of the research) and the American University of Beirut.

Table 1. showing the breakdown of participants, pseudonyms, *the relationship between participants living in the same household and participants' experience in sharing households with others

Household	No. of Participants	Pseudonym	Relationship*	Sharing household (SH), previously shared household (PSH)
1	1	Sarah	-	PSH
2	2	Maria, Zeinab	In laws	SH
3	1	Rania	-	-
4	1	Randa	-	PSH
5	1	Zena	-	SH
6	1	Hanadi	-	PSH
7	1	Hanan	-	SH
8	1	Yara	-	PSH
9	2	Malak, Lara	Mother and daughter	SH
10	1	Dalia	-	PSH
11	1	Fatima	-	PSH
12	1	Rola	-	-

3.1 Participant Recruitment

Approval to visit the informal settlement was obtained from the local municipality in a rural town in the Bekaa region of Lebanon. Based on researcher safety considerations, a local municipality liaison and a Non-Governmental Organisation (NGO) employee agreed on the best settlement for the lead researcher to visit. The informal settlement consists of 20 refugee households living in two buildings. The lead researcher knocked on every door of the settlement and explained the study to the women within the households. Only women were recruited because: (1) men are usually outside the settlement working/seeking work during the daytime [65] and (2) food preparation and purchasing in Arab refugee households is a gendered role [11], women more easily respond to food related questions when compared to men. In total 14 women from 12 households consented to participate in the study. Further participant details are provided in Table 1.

Four grocery shop owners were also recruited to participate in phase two of the study, shown in Table 2. These shop owners ran shops that refugee participants indicated, in phase 1, that they have visited to buy food and other products. Two of the shops (Shop A and B) were located in the town in which the refugees resided; however only shop A was registered to use the e-voucher system in their town. Shop C and D were in distant towns. Shop C and D were indicated by refugee participants to be cheaper than the shops in their town. All the shops were independent locally owned shops ranging in size and their use of the e-voucher system.

3.2 Data Collection

Data collection was carried out in Arabic, the mother tongue of all participants and the lead researcher. All data collected through the study activities were audio-recorded except for two of the interviews with shop owners. In the instances where participants did not consent for audio recording the lead researcher took notes of their responses to the interview questions. None of the participants consented to be photographed.

Table 2. describing the shops that participated in the study. *Travel time is presented as the time it takes to drive to the shop since that is how participants referred to distance.

Shop	Travel Time*	Shop Description	Uses the E-voucher system?
A	5 minutes	Small shop that stocks food and household necessities	Yes
B	5 minutes	Large convenience store that stocks a wide range of products	No
C	30 minutes	Medium sized grocery store that stocks food and household necessities	Yes
D	40 minutes	Medium sized grocery store that stocks food and household necessities	Yes

3.2.1 Phase One. Herein, we adopted dialogical methods that accounted for the research context, research sensitivity and literacy levels of participants. The varying literacies of participants entailed the need to provide participants with methods that rely on imagery versus written methods of data collection. The adoption of dialogical methods enabled the participation of participants of varying literacies, the creation of a safe space for both participants and the researcher and allowed for the construction of shared narratives. Furthermore, methods were selected based on discussions between the lead researcher and refugee participants (see phase one, activity one). For a detailed account of the methodological motivations and the value of adopting dialogical methods please refer to Talhouk et al. [62] where we have presented how the methods were developed and grounded in the researchers' and participants' contexts and research objectives.

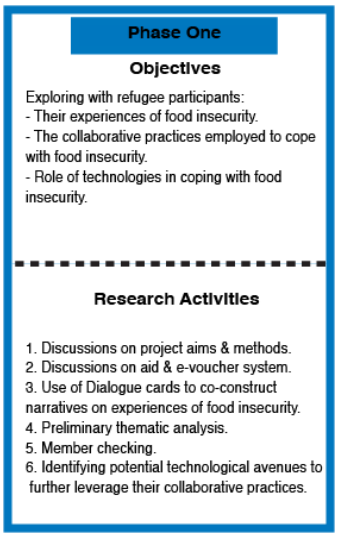

Fig. 2. Detailing Phase One study objectives and activities

Research Activity One: As detailed in [62], during the initial engagements the lead researcher discussed with participants the possible methods that can be employed in conducting the study (Figure 2). These ranged from traditional focus groups/interviews, dialogue cards or diaries. All participants opted to use the dialogue cards indicating that this was a new method they had not tried before as well as a method that everyone could easily participate in given the varying literacy levels. These cards were intended to prompt and facilitate the co-construction of shared narratives of participants' experiences.

Research Activity Two: During the initial engagements in which research activity one took place, the lead researcher also began probing the experiences of participants in engaging with the food aid system through asking questions regarding the e-voucher system and the aid the community was accessing (Figure 2). The questions covered (1) the type of food aid participants accessed, (2) the process they went through to be entitled to food aid and (3) how they interacted with the e-voucher system. The discussions lasted 45-50 minutes.

Research Activity Three: The third activity (figure 2) took place over two engagements (50-60 minutes each) with refugee participants. In this activity participants were presented with the dialogue cards . The dialogue cards presented to participants were contextualised based on existing literature and surveys on food security among refugees in Lebanon [11, 52]. From the literature and surveys, we extracted: the different food coping mechanisms employed by refugee communities in Lebanon; the different actors refugees interact with to cope with food insecurity; the different resources typically found in refugee settlements used for cooking; and the different seasonal changes that influence food security. For the technology dialogue cards, we drew on literature on the different technologies used by refugees in these settings [65] as well as the observations of co-authors, that have conducted research with Syrian refugees for over 5 years. The process resulted in the creation of a total of 50 cards divided into 8 categories representing: different foods (e.g. legume based dishes); members of the refugee community (e.g. neighbors within the refugee settlement); members of the host community (e.g. Lebanese employers); members of the aid system (e.g. shop owners that are part of the e-voucher system); resources (e.g. gas); food coping strategies (e.g. borrowing food); technologies (e.g. smartphones) and seasons (e.g. winter).

As the first step of conducting this activity, the lead researcher introduced to participants the different categories of dialogue cards and the aims of the engagement. Given that we had 8 card categories, we wanted participants to divide themselves into 8 groups so that each group would represent one of the 8 categories of cards. The participants then self-selected themselves into 7 groups of two. Given the odd number of participants, one participant was not in a group however she was encouraged to engage with the lead researcher and the other groups throughout the activity.

Participants then sat in a circle around the room with participants in the same group sitting next to each other. Groups were asked to select which card category they would like to represent and be responsible for highlighting elements of narratives according to the card category they select. The card category that they represent was also the category that they would use to initiate a narrative. For example, group 1 selected the 'food' cards and group 2 selected the 'seasons' cards to be the categories through which they initiate a narrative as well as supplement others' narratives. Then, participants were asked to work across the groups to construct shared narratives, by taking turns in discussing with people in their group and the larger participant group which card they want to start a narrative with and then selecting a card to put in the middle of the circle. The other groups would then use their cards to further build the narrative started. In the case of the participant not in a group, she was advised to engage with the rest of the participants when discussing which cards in her category she intended to use. The researcher continuously prompted participants to vocalise their choice of cards as well as their opinions regarding the other cards being placed in the middle of the circle by other groups. Throughout the process the lead researcher also encouraged participants to discuss counter narratives and/or reflections. Additionally, participants were given blank cards on which they were asked to depict any new people, technologies and/or factors that were not already available in the existing cards. To best describe this process, we provide an example below that details how the cards were used:

Group 2 had selected to use 'seasons' cards as the category they represent. They proceeded to place the card representing the winter season down in the middle of the circle the participants had formed. This was considered the initiator card for this round. Participants explained that winter is a hard time for all of them. The limited availability of work and the added costs to stay warm make it harder to cope with food insecurity. All the other participants agreed and stated that during the winter season they need to manage their resources. Group 4 that had the 'resources' cards agreed and indicated that they have to cut down spending on non-essential resources such as WiFi connection. They proceeded to make a 'resource' card for WiFi (as a resource, not a technology) and placed it in response. Another

participant countered the narrative by pointing out that in the winter because they have fuel burners on to stay warm, they cut down on gas expenditure. Participants in Group 1 holding the 'food' cards agreed and highlighted that anyways in the winter they tend to cook more stews that cook well on the fuel burners, and they placed the card that represents stews. Participants in group 7 with the 'members of the refugee community card' contributed to the narrative by recounting how running out of gas is difficult especially if they cannot afford to buy a new gas canister. They then proceeded to recount how if they run out of gas in the middle of cooking, they carry their pots to their neighbor's house and continue cooking there. The researcher then prompted for further examples of how community members are sharing cooking resources such as stoves, gas canisters and fridges.

This process was repeated each time with another group initiating a narrative until participants indicated that the narratives presented and discussed were exhaustive. The method was used to allow all participants the opportunity to reflect on the shared narratives from the perspective of multiple factors that influence their experiences of food insecurity and their interactions with the aid system. After each narrative was co-constructed the researcher asked participants to elaborate on the current and/or potential role of technology in supporting them in being food secure as well as the collaborative practices that participants are engaging in.

Research Activity Four: We, the researchers, conducted an inductive thematic analysis [6] on the data generated from activity three and generated preliminary codes (Figure 2).

Research Activity Five: In this research activity member checking was conducted [14] (Figure 2). Preliminary themes were presented back to participants with the data corresponding to each. This was done by presenting the themes, codes and quotes on a large sheet that the lead researcher verbally walked participants through. As every theme was presented, participants were asked if there is anything they would like to add, remove or further elaborate on. The codes, themes and quotes were amended and regrouped based on the discussions held among participants. This was done to confirm that data saturation was met regarding refugee experiences of food insecurity and the collaborative practices that participants engage in.

Research Activity Six: While member checking we discussed with participants the next steps for the project and identified the additional avenues to pursue regarding how technologies may support collaborative practices. We also identified that we need to further explore how existing factors of the food aid system, including the e-voucher system, interplay with refugee collaborative practices and any potential collaborative technologies (Figure 2). Research Activities Five and Six concurrently took place over two engagements with participants, each lasting between 30-40 minutes.

Fig. 3. Detailing Phase Two study objectives and activities

3.2.2 Phase Two. Research Activity One: Vignettes are short scenarios that are presented to participants followed by a series of questions through which responses are elicited [4]. We used vignettes (Figure 3) to explore the feasibility and practicalities of technological designs that were based on the data collected in Phase One. The vignettes allowed us to gain a deeper understanding of participants' collaborative practices surfaced in Phase One, and how they would interplay with current and future technological designs. The vignettes also explored how the proposed technologies would function within

refugees' socio-technical context. The research activity was conducted across two engagements (45-50 minutes each).

The two vignettes center around a refugee woman, 'Aziza', who lives in a similar setting to our participants and is struggling with food insecurity. In the first vignette Aziza is considering with her neighbors whether to start engaging in collective purchasing and in the second Aziza is exploring ways in which she can share and access knowledge that would support her in coping with food insecurity as well as increase her agency when engaging with shop owners and the aid system. The lead researcher would verbally present to participants the scenario in the beginning of each of the vignettes and then ask them as a group to (1) reflect on the scenario and the motivations of the character in the vignettes and (2) the options that the character has in terms of going about collective purchasing. Whenever participants referred to personal experiences of collective food purchasing, the researcher would prompt them to consider how such practices can be applied to buying other products and/or at a larger scale. Additionally, each vignette was followed with "What if" questions that introduced several factors for participants to consider such as negotiating loans among themselves, pooling resources (cash and aid in their e-vouchers), negotiating with shop owners (with/without e-voucher systems), and sharing knowledge regarding new experiences as they arise (e.g. What if Aziza hears from her relatives in another town about a new shop that has opened there and is cheaper than the shop near her community?).

Research Activity Two: Semi-structured interviews (25-35 minutes each) with shop owners (Figure 3) were also conducted to explore the feasibility and practicalities of the technological designs suggested by refugee participants in Phase One. The interviews with the shop owners were designed to give us a deeper understanding of (1) the e-voucher system, (2) shop owners' interactions with refugees, (3) their readiness to engage with refugees through the technologies proposed by refugee participants (i.e. collective purchasing).

Research Activity Three: The lead researcher conducted observations in the shops which were registered to dispense food aid to refugees (Figure 3). Observations were recorded on a journal in which interactions between refugees, shop owners and the e-voucher system were documented.

Research Activity Four and Five: Thematic analysis and member checking (Figure 3) was conducted in a manner similar to that described in Phase One.

3.3 Data Analysis

The data was first manually coded and then grouped into themes before themes were presented back to participants for member checking in Arabic [14] (Figure 1). Upon completion of each phase of the study, audio recordings and notes from the engagements were transcribed and translated to English and inductive thematic analysis was conducted on the translated corpus of data [6]. The data was analysed using Nvivo 10. Themes were then presented to the rest of the research team that critically interrogated them. This paper presents the themes which relate to interactions with food aid technologies. Due to stipulations by the local ethical approval attained for this study that entail that raw data can only be accessed by the research team, anonymised raw data cannot be shared.

4 CONTEXT

In this section, we present the socio-technical context in which refugee participants cope with food insecurity and the e-voucher system in order to appropriately contextualise the interactions and experiences presented in our findings. We use literature as well as data from our study to provide a rich picture of participants' food insecurity, social and technical context, including details on the e-voucher system. The contextual knowledge enables us to gain a nuanced understanding of how

the e-voucher system is not experienced in a silo but rather interplays with the social, political, economic and technical factors that shape refugees' lived experiences.

4.1 Syrian Refugee Food Insecurity in Lebanon

The Food and Agriculture Organization of the United Nations defines food security as existing "when all people, at all times, have physical and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" [25]. The Vulnerability Assessment of Syrian Refugees In Lebanon [69] showed that more than 34% of Syrian refugee households have been found to be moderately to severely food insecure and are therefore consuming an inadequate diet. 90% of Syrian refugee households in Lebanon were employing one or more food-related coping strategies, with the most commonly used coping strategies being reducing portion sizes and/or the number of meals per day. Additionally, 40% of households were found to be borrowing food from their neighbors and relatives in order to cope with food insecurity. In our study, all refugee participants discussed how food insecurity is one of the biggest challenges they continuously face.

These higher levels of food insecurity among refugees are associated with the increased economic vulnerability of Syrian refugees. Restrictive economic and social policies limit their ability to legally engage in the Lebanese workforce [35]. In the Bekaa region, where this study was conducted, the average monthly per capita income has been reported to be 30 USD with only 36% of the population working [69]. When exploring their experiences as refugees, participants indicated that there is an adaptation curve in which they had to learn how to cope with their new context shaped by poverty. Yara stated: *"Back home I had my house we had our business, we did not have to worry about money and food"*, *"In Syria, we were well off but I moved here…I now know how to adapt to live with what we have"* [Rania].

With the persistence of such policies, efforts to enhance refugee food security through improving refugee livelihoods are limited [11]. The provision of food aid by humanitarian organisations is therefore the primary pathway to addressing Syrian refugee food insecurity in Lebanon. Those receiving food aid receive 30 USD per household member through the e-voucher system, where a household member is defined as direct family members living with them and are listed in their United Nations High Commissioner for Refugees (UNHCR) file [22]. In this study we did not directly ask participants regarding their income and the amount of aid they received as this is considered to be a sensitive topic that participants may not want to share with others in their community. However, all participants identified that they are either current or previous beneficiaries of the e-voucher system. In line with the literature [54], participants indicated that the men in their households did manual labor in the agriculture and construction sectors that are seasonal in nature, thus making them more food insecure in the winter.

4.2 Socio-technical Context

All but two participants lived in the two buildings that constituted the settlement. While the remaining two participants in Table 1, had previously lived in the buildings, they had since moved into other nearby flats. Participants indicated that when the Syrian crisis began, their Lebanese landlord built these buildings to be rented out only to Syrian refugees. The two buildings are not fully constructed but are habitable. The buildings are enclosed by an encircling wall that acts as a divider between the refugee community and their Lebanese host community with only one gate through which they may enter or leave. Participants recounted narratives of moving from town to town until they found a town in which they felt safe, *"I first lived in Daya'a but we heard that this town treats refugees better, so we moved here" [Rola].* Knowledge of towns that were perceived to be more welcoming than others was communicated by relatives and other refugees who had previously

visited and/or worked in the town before the war in Syria began. Furthermore, all participants indicated that they had experienced living in shared households with their extended family at different points in time since coming to Lebanon. Participants also highlighted that depending on the changes in the conflict zones in Syria, they often have extended family come live with them for months at a time before finding a place to live in Lebanon.

All the refugee participants had children and three were grandmothers living with their children and grandchildren. Refugee participants' ages ranged between 21 and 55. Educational status varied among participants with some being of low literacy and few having completed secondary school. All participants only spoke Arabic. Only one participant, Rania, reported having attained a vocational diploma in business administration while in Syria but had not worked in Syria or Lebanon. Other participants indicated that they also had not previously worked in Syria or in Lebanon except for one participant, Hanadi. Hanadi reported that in Syria, before getting married, she worked as a hairdresser and beautician and currently tries to supplement her husband's income by offering her services to the women living in her community. She highlighted that, as of yet, she did not have any Lebanese customers. Only one participant, Yara, indicated that she had a friend from the Lebanese community while all the others described their relationships with members of the Lebanese community to be based on transactions e.g. school bus driver. Participants highlighted that they mostly socialised among themselves.

Technologies observed within the community included old televisions and smartphones. All participants were using android phones, with only some of them having Lebanese SIM cards. Participants reported that their husbands had smartphones with Lebanese SIM cards however due to the high price of telecommunications in Lebanon, the majority kept their Syrian SIM cards. At the time of the study, all participants had access to WiFi but not data plans and so connecting to WiFi was their only means to access the internet. However, some stated that during months in which they are struggling to make ends meet they would discontinue paying for WiFi. Participants predominantly used their smartphones to access WhatsApp and Facebook. They also used dictionary apps to help their children learn English, which is taught in the Lebanese schools their children were enrolled in. Only one participant, Rania, had a second-hand Personal Computer in her household but she said that she does not use it. Participants reported that a number of NGOs run vocational and computer training in community centres, however, the cost of transportation to get to the centres and the lack of childcare made attending training difficult for participants.

Being able to access safe and affordable transportation has been identified in HCI and humanitarian research to be a key element that we need to consider when designing technologies and interventions within this space [50, 65]. Refugee participants reported that they try to do their shopping once a month in order to limit costs of transportation that range from 5,000 LL. (4 USD) to 15,000 LL. (10 USD) per trip. Through the engagements in Phase One, they discussed that only very few people in the community have a car. Furthermore, even those with cars indicated that traveling to other towns makes them legally more vulnerable: *"We brought our own car with us from Syria, but now the car is illegal, and we can be stopped at a [government] checkpoint" [Dalia].*

4.3 The E-Voucher System

Our observations and engagements with the refugee participants and shop owners allowed us to gain an understanding of processes within the food aid system and the e-voucher system itself.

4.3.1 Selection of Shops. Shops in towns in which refugees reside and/or near large refugee settlements are scouted by the organisation that runs the food aid programme; in this case the World Food Programme (WFP). The shops are selected to become registered shops in which e-vouchers may be used by refugees. Shop selection is based on (1) readiness of the shop to cater

to refugees, (2) the range of food products available in the shop and (3) the hygienic standards of the shop. In some cases, the shops received Hazard Analysis and Critical Control Point (HACCP) [26] training from the aid organisation. The aid organisation also follows up on this training by randomly visiting shops to ensure that the shops are up to the hygiene standards. The number of shops selected per town or village was dependent on the refugee population density in the area. This meant that in some towns, like the town where our study took place, there is only one shop (Shop A) registered as part of the e-voucher system where refugees could use their food aid. The other shop in town, Shop B, decided to not be a part of the e-voucher system saying, *"We already have a lot of Lebanese customers, thank God,... we do not want them [refugees] to come and overcrowd the shop and affect our existing customers"*.

It is important to note that unlike other food aid systems studied within ICT4D [42], the aid organisation is not involved in the supply of food to registered shops. Registered shops maintain the food supply chains that they had previously established before becoming registered shops.

4.3.2 Selection of Beneficiaries. The food aid response for Syrian refugees in Lebanon is targeted, meaning that the system aims to identify the most vulnerable refugee households and supply them with aid rather than provide blanket aid to all refugees. Upon registering with the UNHCR, refugees undergo a vulnerability assessment and a home visit. The vulnerability assessment consists of a questionnaire that is administered by an NGO worker face-to-face and assesses multiple aspects of the household including education, health, basic needs, shelter and food security. If through the assessment the household is identified to be food insecure and/or at risk of being food insecure based on their economic and social conditions they are granted food aid, that comes in the form of an e-voucher.

4.3.3 The Technological System. The e-voucher system consists of two main technological components: (1) the e-voucher card held by refugees and (2) the e-voucher system in shops. The e-voucher card functions as a debit card and is linked to a bank account in which the aid organisation deposits a sum of money to be used by refugees in registered shops. Refugees do not have access to that bank account in banks and were observed to ask the shop owner regarding their balance. This interaction was further verified by participants. Refugees can only use their e-voucher to buy food products from registered shops.

Registered shops have a computer installed as well as a bar-code reader and an e-voucher/debit card reader. Once a refugee is ready to make a transaction the shop owner or employee scans the food products and verifies that the card holder is the refugee entitled to aid using their profile picture on the food aid system. Having passed this verification step, the refugee enters their PIN number to complete the transaction using the card reader. However, during our observations the lead researcher witnessed refugees showing their PIN number (written on a piece of paper) to the shop owner/employee and asking them to input it on their behalf to complete the transaction. Such practices were further corroborated by both shop owners and refugee participants. Refugee participants indicated that their initial reliance on others to interact with the system was because of their limited experience in using banking technologies. Before coming to Lebanon, they had not previously used debit cards and conducting such transactions mediated by technology was something they had to learn and adapt to.

As previously mentioned, purchases through the e-voucher system are limited to a select number of shops and exclusively to food products. This is intentional to ensure that the aid is used to directly meet the food needs of refugees. To further ensure that food aid is not misused, shop owners highlighted that upon becoming an e-voucher store, shop owners are provided with further guidance from the aid organisation on how to dispense aid. This includes, as mentioned above, the verification that the person using the card is the refugee entitled to the aid on behalf of their

household. Furthermore, shop owners are advised not to sell large quantities of one kind of item to a refugee in order to avoid refugees reselling food items purchased using aid. One shop owner used rice as an example and detailed that if he suspects that the quantity of rice being purchased is more than the quantity that refugees typically purchase for one household, he does not proceed with that transaction. In subsequent findings sections, we show how these restrictions within the e-voucher system interplay with refugees' collaborative practices, such as collective purchasing, as well as produce power and information asymmetries that result in negative experiences for refugees.

4.3.4 Monitoring/Auditing. Via monthly emails, the aid organisation provides a recommended pricing for food products that they advise shops to adopt. However, the final pricing is left to the discretion of the shop owners. Shop owners indicated that the final decision regarding pricing is up to them, *"It is up to me to decide the final price and I do take into consideration the guidance of the aid organisation because I don't want to upset them [the aid organisation]" [Shop D].* Every month shops send a report to the WFP with a list of the prices of the items that they sell. The report that they send to the aid organisation allows the organisation to compare prices across the different registered shops and other market prices. Shop owners reported that this is done to show the organisation that refugees are not experiencing price discrimination. Through our data collection we did not identify other more stringent forms of monitoring practiced by the aid organisations such as receipt auditing where individual purchases are monitored. Additionally, one of the key findings in this study is that refugees and shop owners collaborate together in order to work through a loophole in the system that is not detected through the current monitoring system to purchase non-food items. In the following findings section, we show that while such collaborations enable refugees to use their e-voucher to buy non-food products they also increase the power asymmetry between them and shop owners thus making it more difficult for refugees to negotiate for more competitive prices.

As highlighted in our related work section, refugee experiences and barriers to accessing services are shaped by their socio-technical contexts. Our findings further extend this knowledge by highlighting how the unique socio-technical context, presented above, in which refugees interact with the e-voucher system and other stakeholders contributes to how collaborative practices of coping with food insecurity are negotiated within a refugee community as well as with other stakeholders in the food aid system.

5 FINDINGS

Here we first present participants narratives of interacting with other stakeholders and the e-voucher system and the resultant information and power asymmetries. Through these narratives we identified how leveraging refugee collaborative practices within the community may enable them to better address their food insecurity and counter existing power asymmetries. However, we also present the interplay between collaborative practices and the existing food aid technology, the e-voucher system.

5.1 Digitised Aid, Technological Literacies & Information Asymmetries

Refugee participants recounted that not knowing how to use the e-voucher system when they first received this particular form of food aid left them vulnerable to negative experiences and feelings of insecurity. One participant, Fatima, said that at first they did not know how to use the e-voucher and would therefore give it to an intermediary to buy food products on their behalf: *"at first we used to give our card to a man who owned a shop that wasn't a WFP shop and he would go and buy the stuff for us from another shop...he was a thief" [Fatima].* Participants highlighted that such narratives are common as when they first moved to Lebanon and received e-vouchers they did not know who

to trust as intermediaries and only found out about discrepancies when comparing purchases and prices among themselves.

Refugee participants also highlighted the lack of information they have regarding their aid to be a contributor to their reliance on shop owners as intermediaries. Several participants indicated that they often do not know the amount of aid they are receiving, *"I got a red card [a debit card given to them from an aid organisation] but it has not been activated yet and we don't know what it is for… This month they have registered us again for aid but we don't know what they want to give us" [Rania].* As previously mentioned in Section 4, the only way reported by participants to check their e-voucher balance is through the shops. Participants recounted that they rely on the shop owner to tell them their balance. The shop owner in shop D, identified that refugees' lack of information regarding their balance and their lack of familiarity with using debit cards sometimes puts refugees in a vulnerable position. He recounted that often refugees give shop owners their PIN numbers to check their balance and shop owners use this as an opportunity to withdraw money undetected by refugees:

> *"they [some shops] withdraw money from it without telling the refugee… it is because they [refugees] don't know how to use the system, so they give us [shop owners] the pin number to enter it" [Shop D].*

Refugee participants indicated that at the time of these experiences they had no clear avenues through which they can hold shop owners accountable and report such cases to the aid organisation.

5.2 Power Asymmetries & Digitised Aid

Further to the negative experiences refugees had as a result of their low technological literacies and information asymmetries, refugee participants also indicated that restrictive elements of the e-voucher system sometimes place them in situations where they feel vulnerable. The design of the system that restricts transactions to only a select number of shops registered with the WFP and to only food products resulted in refugee participants being reliant on specific shop owners.

Participants explained that there is only one shop within walking distance of their settlement where they can use their e-vouchers (Shop A). They noted that, coupled with their limited access to safe and affordable transportation, this limits their ability to access shops that use the e-voucher with more competitive prices that are further away. When asked if they often go to e-voucher shops that have cheaper food but are in other towns (Shop C & D), one participant responded: *"No, by God, we don't have a car" [Hanan].* Even those with cars reiterated that traveling out of the town exposes them to the risk of being stopped at government checkpoints. Due to these reasons, they have frequented Shop C & D much less than Shop A.

Other than the e-voucher being restricted to only one shop in their vicinity, refugee participants highlighted that the restriction of the e-voucher to only food purchases results in experiences of collaborating with a shop owner to engage in a loophole in the system. These gray area transactions allow refugee participants to purchase non-food items using the e-vouchers all the while inputting the purchased goods as food items. For example, one participant recounted how when she wants to buy washing liquid to clean her kitchen, the shop owner would give her the washing liquid and would then scan through the system multiple food items that equate to his pricing of the washing liquid. This enabled her to buy non-food items with her e-voucher: *"We also use the food vouchers to buy cleaning detergent for the house, don't we need those [to have healthy food]?" [Zena].* Refugee participants described his pricing strategy as opportunistic and highlighted that because of their reliance on him they feel powerless in regards to challenging him when he uses their need for non-food items to increase his prices.

As described in Section 4, the current monitoring system employed by the aid organisation does not capture the price discrimination that is resultant of such gray area transactions as it is not the price of the food item that is increasing but rather the quantity of food items being scanned through the system. When engaging in gray transactions shop owners simply scan in more food items until their pricing of the non-food item is met.

5.3 Collaborative Practices within the Community

When discussing with refugee participants how technologies may increase their food security participants suggested the potential for further leveraging the existing community collaborative practices, including collective purchasing. Refugee participants co-constructed narratives around how collaborative practices formed in their new households and refugee communities and discussed how they support them in coping with food insecurity.

5.3.1 Developing Collaborative Practices as New Households Form. Participants identified that there was a phase of adapting to living with extended family members in the same household: *"I was living alone and then, all of a sudden, I found myself living with several other families" [Rola].* Using the people dialogue cards, participants reflected on how living with extended family members impacted their eating habits and ultimately their food expenditure: *"My son would have already eaten but then he would see his cousins eating and he would want to eat again" [Fatima]; "when we were living alone one loaf of bread was enough for a week, but when my sister in-law lived with us we would buy three loaves a day" [Rola].* Through such statements, the participants clearly articulated how their food habits had been shaped by the shift from individual to collective food practices. Participants indicated that they had to adapt to discussing food expenditure within their shared household, which was not common when they lived in Syria. This became apparent as they realised that they had to start keeping track of who bought what, by writing down expenses and payments, and to learn *"how to control our expenditure" [Maria].*

Part of the adaptation was also learning how to strategically use their e-vouchers within shared households and not spend them on items they now consider a luxury: *We learnt that with my daughter's food voucher we should buy the essentials like rice and oil only, rather than buying cheese that we fancied" [Malak].* Additionally, participants relied on the knowledge of relatives who had arrived before them to identify shops where they could buy cheaper foods. At first, *"It took us a while, by God it took us a while, when you first come, you don't know where the market is. You take 100,000 L.L. (66 USD) and buy only few things" [Zeinab].* Refugee participants highlighted that the purchasing power of money in Lebanon was much less than in Syria. Consequently, they adapted to this by having open discussions about finances within their households as well as seeking advice from other women regarding how to manage food expenditure: *"The lady [her neighbor] used to tell me get this or don't get that and for example, when a guest comes get and do whatever you can afford, you don't have to borrow money" [Yara].*

5.3.2 Forming Collaborative Practices as a Community. Refugee participants indicated that over time they have built a sense of community within the settlement:

> *Hala: "Personally, I would say the people living in the same building as me [are my community]. They are like relatives living around each other"*
> *Sarah: "there is enthusiasm and love towards each other…I told you, we are like sisters here"*
> *Hanadi: "My friends, my Neighbors, my family…this is my community."*

It is this sense of community that enabled them to start engaging in collaborative practices in order to better cope with food insecurity.

Refugee participants described practices of sharing small amounts of food when needed. They reported that in time of need they borrow small quantities of food from one another, *"Sometimes you have to borrow from your neighbor garlic, onions or rice" [Zena]*. They indicated that they can only borrow food from one another in small quantities because *"we are living in the same situation [of food insecurity]" [Fatima]*. Participants described sharing food resources as a system of care that is practised in good faith, *"They don't ask for it back but you return it out of good faith because you can't ask for something else if you need it later on" [Sarah]*.

Collaborative practices were also initiated around the use of other resources. In one instance, one participant indicated how, when she runs out of gas in the stove, she carries the pots and continues cooking the food in her neighbor's kitchen. Collaborative practices were also extended to the pooling of cash as a resource for collective purchasing.

5.3.3 Collective Purchasing. Refugee participants indicated that when cash is available, they adopt collaborative practices that result in lower transportation and purchasing costs.

As previously mentioned in Section 4, participants found the cost of transportation to be a key factor that they consider when accessing services and going to purchase food. Two participants used the dialogue cards to co-construct a narrative in which they recounted that they sometimes share transportation costs in order to go shopping when they have cash available to them to buy food from markets that are cheaper: *"If I know that she (Fatima) is going to the vegetable market, I go with her" [Rola]*. Participants also indicated that in the absence of their husbands they do not feel safe taking public transportation and therefore sometimes co-ordinate among each other to go in groups of 4 or 5 to for food shopping.

Another collaborative coping strategy employed by community members was using cash, when available, to collectively purchase foods that are too expensive to purchase alone:

> *"Once I wanted to buy a box of tomatoes, but it was expensive, so Fatima and I bought it together and we split it" [Maria].*
> *"We do that, for example if we want to buy olive oil which is expensive, we buy it and divide it among us… that way we can afford to pay for it" [Zeinab].*
> *"We try to benefit [together] from offers as much as we can" [Fatima].*

Refugee participants emphasised that their current practice of collective purchasing can be further leveraged in order to further decrease transportation and purchasing costs. Consequently, we went about investigating how such a practice can interplay with the current food aid system in place through honing in on the tensions between refugee practices and the food aid system in phase two of the study.

5.4 Refugee Collaborative Practices & Digitised Aid

By reflecting on the vignettes, participants envisioned how further leveraging current collective purchasing practices may enable them to get better deals, access more competitive markets and counter existing power asymmetries. However, the data also shows how with existing e-voucher restrictions collective purchasing may not be feasible.

Refugee participants said that through further enabling collective purchasing they would be able to save on the price of rice, for example:

> *Fatima: "so by this [collective purchasing] I would be saving on the price of a kilogram [of rice]"*
> *Rola: "I would be saving on the price of 3kg [of rice]!"*

Refugee participants also elaborated on how their purchasing practices would change accordingly as saving on some items would allow them to purchase more food and/or would enable them to purchase items they would not have been able to purchase otherwise:

> *Sarah: "[even if] it's a difference of 1500LL (1 USD) [saved by collective purchasing]… with the 1500LL you can get three cans of beans".*
> *Lara: "the most important thing is to look at discounts and offers. There is always an item that is expensive… so we need to save up on other items to pay for it."*

Other participants projected that through collective purchasing they would be able to benefit from bulk buying deals to purchase more non-perishable food items, such as rice, and cleaning detergent and store any surplus for the next month:

> *Zena: "I can save by this [engaging in a collective purchase] and get 7kg [of rice] and then the coming month I wouldn't need to buy rice for example!"*
> *Zeinab: "So each month, we [the community members] should get one product like this [detergent of a bigger quantity]… and by doing this the next month we don't have to buy it"*

Furthermore, participants highlighted that through collective purchasing they may be able to counter transportation costs by requesting from shops to deliver the collective purchase to the settlement if the purchase is large enough or by sending a community member to pick up the collective purchase on the behalf of others. They also discussed how if they were able to use their e-vouchers for online collective purchasing they would be able to access e-voucher shops in other towns:

> *"We can divide the delivery cost across all of us" [Hanadi]*
> *"Delivery would be good for people like me, who don't have cars [and want access to shops in other towns]" [Maria]*

Additionally, when reflecting on the vignettes in relation to their previous experiences with shop owners refugee participants discussed how through collective purchasing community members with cash available to them can buy non-food items for others and be repaid with food items bought using e-vouchers. By doing so they would not be reliant on shop owners to engage in gray area transactions. They viewed collective purchasing as a means of increasing their agency and mitigating the existing power asymmetry that is resultant from gray area transactions.

Despite interest in further leveraging their existing practice of collective purchasing, participants indicated that the e-voucher system and the way it is configured may pose a barrier. Participants highlighted that the identity verification step carried out by shop owners would make it impossible to have purchases delivered to them and/or having one person collect it on their behalf. They highlighted that *"They say that you have to use it [the e-voucher] in person" [Rola].* Furthermore, a shop owner highlighted that despite him being agreeable to one refugee purchasing on the behalf of others the e-voucher restrictions dissuade him from doing it:

> *"it would have to be for people buying using cash… because for the e-voucher we need to make sure it is them" [Shop A]*

Additionally, while all the shop owners indicated that they will be willing to provide lower prices, discounts, offers and delivery services for large purchases they also highlighted that the guidance that they receive against selling large quantities through the e-voucher system needs to be considered. One shop owner said: *"I don't sell in bulk because he [the refugee] will take them and sell them. The UN asked us to be careful of that" [Shop D].*

Through the concerns expressed by participants we find that the existing restrictions and advice given to shop owners on how to use the e-voucher, which are intended to reduce the misuse of food aid, act as barriers to refugees leveraging their food aid through collective purchasing.

6 DISCUSSION

Our findings show how the food aid technology creates spaces in which refugee insecurities are heightened due to the socio-technical environment in which the technology is situated as well as the restrictions introduced by the system. Lastly, we show the interplay between the digitisation of aid and the collaborative practices adopted by refugees to cope with food insecurity. In this section we discuss our findings in relation to previous literature and provide recommendations for CSCW researchers and humanitarian innovators.

6.1 Experiences as a Result of Shifting Relationships & Power/Information Asymmetries

We found that refugee participants encounter a series of vulnerabilities and insecurities when engaging with the food aid system that can be attributed to the digitisation of aid. Indeed, the lack of familiarity with digital transactions resulted in some refugee participants relying on intermediaries. Previous literature, has shown the importance of collaborating with trusted intermediaries to use technologies as an enabling factor [28, 44]. However, we found that as refugees move into new communities they experience difficulties in identifying trusted intermediaries which can also be attributed to their social isolation within their host communities. This calls for digital aid to be supplemented with interventions or technologies that build on existing research on refugees' social capital [3] to support refugees in engaging in these new contexts with trusted intermediaries.

Additionally, situating a digitised form of aid in shops is an example of how technologies play a role in shifting relationships between aid organisations and their beneficiaries [21, 34]. The e-voucher system has enabled aid organisations to shift the point at which aid is accessed from NGO workers to local shop owners. This not only places a physical distance between refugee communities and aid workers [20], but also positions shop owners as the new gatekeepers of food aid and aid information. This shift creates an asymmetry in power and information that resulted in some instances where participants experienced shop owners taking advantage of their control over the digital aid system to siphon off refugee aid when acting as intermediaries. The shop owners' practices, as reported by participants, can be viewed to be similar to the corrupt practices of ration dealers in the Indian food distribution system [45]. However, while it is reported that in the context of India the monitoring technologies were ineffective as already existing corrupt practices were maintained [39, 45], our findings indicate that the digitisation of food aid allowed for new spaces in which vulnerabilities were introduced.

Consequently, supporting refugees in their adaptation to digital aid is critical. Increasing the digital literacy of refugees should extend to the functioning of aid technologies, in early stages of their resettlement when they are relying on intermediaries. This entails looking beyond increasing data literacy, as called for by Shoemaker et al. [57], but rather extends to increasing refugee capacities in identifying any misuse of the humanitarian technologies that mediate their day-to-day interactions with the aid system. Furthermore, our findings indicated that recommendations on the sharing of mobile phones among low resource and literacy communities [1, 70] that call for systems to distinguish between intermediary-users and beneficiary-users should be extended to humanitarian technologies.

Furthermore, the experiences reported by participants in which shop owners abused the food aid system may be viewed to be in breach of the humanitarian principles that guide and shape humanitarian policies and action [30]. The principle of humanity explicitly states that *"all human*

beings are equal in dignity and rights, thus all human life should be respected and protected and human suffering reduced" [9, 30]. However, the experiences of exploitation by the shop owners indicate that this principle is not upheld. Cardia et al.'s framework [9] provides guidance for how to integrate the four humanitarian principles into humanitarian technologies. Such frameworks and humanitarian innovation guidance should be expanded so that we can design technologies in a manner that supports multiple stakeholders (e.g. the shop owners), that may be distant from aid organisations, in upholding the humanitarian principles and the mandate to protect beneficiaries. Additionally, participants indicated that they were unable to report their experiences of vulnerability. Therefore, it is important to have formalised lines of accountability through which refugees may flag the misuse of humanitarian technologies by other stakeholders and any breaches to humanitarian principles mediated by technologies. To do this we can build on CSCW literature on crowd sourced movements and integrate systems for reporting abuse and the sharing of experiences [16, 37, 73].

6.2 Interplay Between the E-voucher System and Collaborative Practices

Our findings show that refugee participants were highly motivated to collaborate with one another. Additionally, they often collaborate with shop owners to work around the system restrictions to buy non-food items, a practice that introduced new vulnerabilities.

In the instance of collaborating with shop owners we found that collaborative practices circumvented e-voucher restrictions for the purchase of food only. This workaround enabled refugees to practice more choice in how their aid is used, however, it increased the power asymmetry between refugees and shop owners and resulted in price discrimination that is undetected by the e-voucher monitoring processes in place. Power asymmetries were also amplified by the lack of safe transport to other shops with more competitive prices. It is with this understanding of power asymmetries between refugees and other non-refugee stakeholders that we, as CSCW researchers, can start examining how technologies can be designed to shift power balances in favor of refugee communities. Indeed, by building on existing literature on how technologies can support dignified interactions [8, 66] and, the increase of agency [63] and capabilities [36] we can work towards designing humanitarian technologies that contribute to collaborations in which power asymmetries experienced by refugees are mitigated.

Furthermore, refugee participants' interest in further leveraging the collaborative practices of sharing transportation and collective food purchasing is in line with existing practices among low socioeconomic status communities coping with poverty [73]. The aspiration of engaging in collective food purchasing is similar to that of AFNs, in which people come together to create a community that leverages it's collective agency [47, 48]. However, our findings show that in the case of this refugee community such collaborative strategies and aspirations are restricted by the current food aid technology. Restrictions within the e-voucher system are in place to prevent the misuse of aid [34, 53]. These restrictions are at odds with refugee community collaborative practices and thus do not enable for example cutting down on transportation costs by sending a community member to make purchases on their behalf. Such a restriction makes implementing food delivery as a sharing economy, as advocated by Dillahunt et al. [15], difficult because of the need for each beneficiary to go to the shop to be verified by the shop owner. Additionally, the guidance given to shop keepers to not sell in bulk in order to protect aid from being misused can be viewed as a barrier to refugee community empowerment through leveraging collaborative strategies. It is these tensions that call to question whether AFNs [47, 48] and sharing economies [15, 27] can really be seen as a means of coping with food insecurity in the presence of the current digitised food aid system. Our findings identify a clear space in which humanitarian innovators and CSCW researchers may collaborate to re-envision how humanitarian technologies can support community

collaborative practices. Such considerations would also support policy recommendations for more community oriented aid and programmes [10, 31], within humanitarian research and response.

6.3 Designing for Securities in the Everyday

Our findings provide novel insights into the interplay between humanitarian technologies and the everyday security of the refugee community. Everyday security issues typically focus on the issues that affect an individual and their kin and friendship network [71]. Often the responses to these everyday security issues are collective and relational in nature [17, 44, 72]. Our findings on collaborative practices developed within the refugee community and their limitations when countered with a food aid technology highlight the importance of securing not only individual refugee practices but also the community's collaborative practices.

More recently the HCI Security community has expanded to encompass social conceptualisations of security [12, 13] where the lived experience of individuals and communities is the basis for the identification of and responses to security threats [18, 32]. It is through this lens that we view how high levels of precarity, and the power and information asymmetries experienced by refugees when engaging with shop owners and the e-voucher system make them vulnerable and restricts their ability to collaboratively address their food insecurity. Involving refugees at an early stage of the food aid technologies design process could help to reduce the levels of insecurity felt by the intended refugee community. A design process concerned with everyday security issues would encourage early identification of the food security threats arising from the precariousness of the lived experience when engaging with the e-voucher system as a humanitarian technology and will help account for the socio-technical contexts in which they are deployed. As our data shows, concerns arise from the objective of protecting how aid is used through the e-voucher system versus the collaborative practices refugees adopt to secure food. In the first instance, it is the restrictions on using the system only for food aid and it's situatedness in only one shop in town that led to the anomalous behaviors that left refugee participants more vulnerable (e.g. engaging in gray area transactions). In the case of the refugee community in this study, their limited access to other shops using the e-voucher system is not only attributed to their limited access to transportation but also to the other shop in town not wanting to serve Syrian refugees. Secondly, refugee vulnerabilities were further compounded by the low technological literacy of refugee participants that drove them to collaborate with 'untrustworthy' intermediaries. Consequently, designing an e-voucher system that is usable for refugees is not sufficient to make users of that system feel safe and secure at an individual level. Rather, the system should be designed in a manner that reflects refugee collaborative practices and the social values underpinning them. Affixing values in this way is termed securing [58] and there is a need to address both securing processes (e.g. interactions that refugees have with the system and other stakeholders) as well as the security of the technology. We call for such a lens to be integrated into current policies and guidance provided by aid organisations for humanitarian innovation [68].

7 CONCLUSION

Through investigating a refugee community's experience of coping with food insecurity while engaging with a technological food aid system, we identified how the digitisation of aid shifted the responsibility of dispensing aid from NGO organisations to shop owners, in turn introducing issues of technological literacy; as well as power and information asymmetries. Furthermore, we show how refugee participants have developed collaborative practices including collective purchasing. When further investigating the feasibility of collective purchasing, participants highlighted the added value further leveraging this collaborative practice has in coping with food insecurity. However, the current food aid technology does not lend itself to such forms of collaborative action.

Research within the field of food security has shown that unrestricted cash assistance [1] is as effective as the e-voucher system in supporting refugees to cope with food insecurity [5]. However, while unrestricted cash has been shown to be as positive in terms of improving food security as e-vouchers, they do not match the significant impact that e-vouchers have on improving dietary diversity [5]. Therefore, the WFP is currently trialing combination models where particularly vulnerable refugees receive e-vouchers and an unrestricted cash top-up [5]. It is within such models that we can start designing and piloting technologies for collective purchasing that may leverage the unrestricted cash available within refugee communities. However, given that the refugee community we worked with was mostly reliant on e-vouchers to purchase food we need to consider how the e-voucher system can be re-designed to account for power and information asymmetries as well as the collaborative values and practices within refugee communities.

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